

Before the
COPYRIGHT ROYALTY JUDGES
Washington, D.C.

In the Matter of

Distribution of the
2004 and 2005
Cable Royalty Funds

)
)
)
)
)
)
)

Docket No. 2007-3 CRB CD 2004-2005

Testimony of
Robert W. Crandall

June 1, 2009

TABLE OF CONTENTS

	<u>Page</u>
I. QUALIFICATIONS	1
II. INTRODUCTION AND SUMMARY	2
III. THE COPYRIGHT ROYALTY JUDGES SHOULD ALLOCATE THE 2004-05 CABLE ROYALTY FUNDS AS THEY WOULD HAVE BEEN ALLOCATED IN A MARKET.	3
IV. THE BORTZ CONSTANT SUM SURVEY IS AN APPROPRIATE MEASURE OF THE RELATIVE VALUE OF DISTANT SIGNAL PROGRAMMING	5

Appendix A Curriculum Vitae

I. QUALIFICATIONS

1. My name is Robert W. Crandall. I have been a Senior Fellow in Economic Studies at the Brookings Institution since 1978. Prior to that I was the Acting Director, Deputy Director, and Assistant Director of the Council of Wage and Price Stability in the Executive Office of the President, and between 1974 and 1975 I was an Adviser to Commissioner Glen Robinson of the Federal Communications Commission ("FCC"). I was an Assistant Professor and Associate Professor of Economics at MIT between 1966 and 1974.

2. I have written widely on telecommunications policy, the economics of broadcasting, and the economics of cable television. In 1971 and 1972, I published articles on the FCC financial-interest/syndication rules in *The Journal of Law and Economics* and the *Bell Journal of Economics*. In 1974, I co-authored an article on cable television profitability in *The Journal of Business*. In 1974, I also published an article on the economics of network television in *Public Policy*. In 1978, I published an article on the economic effect of television broadcast regulation in *Regulation*. In 1981, Stanley Besen and I coauthored a paper on cable television regulation that was published in *Law and Contemporary Problems*. In 1990, I conducted a number of empirical studies of the cable television industry that were submitted in various FCC proceedings on behalf of TCI and are incorporated into a chapter in Bruce Owen and Steven Wildman's *Video Economics*, published by Harvard University Press in 1992. I am the co-author of two books released in 1996 by the Brookings Institution: *Talk is Cheap: The Promise of Regulatory Reform in North American Telecommunications* (with Professor Leonard

Waverman) and *Cable TV: Regulation or Competition?* (with former FCC Commissioner Harold Furchtgott-Roth) and the author of *Competition and Chaos: U.S. Telecommunications since the 1996 Telecom Act*, published by the Brookings Institution in 2005.

3. I have served as a consultant to several government agencies and participated in a variety of government advisory panels. Between 1967 and 1968, I was a consultant to the Justice Department on a variety of network television and motion picture issues. Between 1978 and 1979, I served as a consultant to the FCC on the deregulation of signal carriage rules for cable television. I have also served as a consultant to several clients on matters relating to copyright and product licensing issues -- including the National Cable Television Association, the three major television broadcast networks, and other cable and broadcast industry clients.

4. I testified before the Copyright Royalty Tribunal on behalf of the Joint Sports Claimants ("JSC") in the 1989 cable royalty distribution proceeding and on behalf of the National Cable Television Association in the 1981 proceeding to adjust cable royalty rates. I also testified before the Copyright Arbitration Royalty Panel on behalf of JSC in the 1990-92 and 1998-99 cable royalty distribution proceedings.

5. I am offering this testimony on behalf of JSC in my individual capacity and not as an employee of the Brookings Institution, which does not take institutional positions with respect to specific legislation, litigation, or regulatory proceedings.

6. A copy of my curriculum vitae is attached as Appendix A.

II. INTRODUCTION AND SUMMARY

7. In this testimony, I conclude that:

- The copyright royalties paid by cable systems to import distant broadcast signals should be allocated as they would have been allocated by marketplace transactions.
- The best evidence on how the marketplace would have allocated these royalties is to be found in constant sum surveys of cable system executives who are asked how they would have allocated a fixed budget for imported distant broadcast signals.

III. THE COPYRIGHT ROYALTY JUDGES SHOULD ALLOCATE THE 2004-05 CABLE ROYALTY FUNDS AS THEY WOULD HAVE BEEN ALLOCATED IN A MARKET.

8. Typically, a copyright holder of non-network programming on a broadcast television station is directly compensated by that station for the use of the copyrighted programming at a rate negotiated between the station and the copyright holder. The broadcast station generates revenues from broadcasting the copyrighted programming through advertising inserted in the programs. When a cable system retransmits a “distant” broadcast station’s¹ signal over its facilities, the programming on that broadcast station becomes available to a larger audience than otherwise. Because the retransmitted signal contains the programming of many different copyright holders, Congress thought that there would be large transaction costs if the cable system operator had to negotiate individually with each of these numerous copyright holders for the rights to offer all of the programs offered over that signal.

9. Accordingly, Congress established compulsory licensing as a substitute for arms-length transactions between cable systems and individual copyright holders of

¹ A distant broadcast station, in general, is a station that is not located in the cable system’s television market and whose carriage was not mandated under the FCC’s 1976 or current “must carry” rules.

distant-signal programming.² The terms of the compulsory license are set by statute. The resulting license fees paid by cable systems are collected by the Copyright Office in a cable royalty fund to be distributed to the copyright owners whose “non-network”³ programming has been retransmitted on distant broadcast signals.

10. Congress initially gave the authority to distribute these royalties to the Copyright Royalty Tribunal (“CRT”). The CRT was replaced with the Copyright Arbitration Royalty Panel (“CARP”), which in turn was replaced by the current Copyright Royalty Judge system for royalty distribution.

11. The CRT and CARP concluded that the allocation of royalties must be based on how copyright holders would have been compensated in a market environment.⁴ Thus, in the last litigated proceeding (covering the royalty years 1998 and 1999), the CARP concluded that “one distribution criterion appears to have stood the ‘test of time’ and has served as the principal basis for allocating cable copyright royalties -- ‘relative marketplace value.’”⁵ In other words, the CARP’s “primary objective is to ‘simulate [relative] market valuation’ as if no compulsory license existed.”⁶ It then proceeded to analyze a hypothetical marketplace in which “absent a compulsory license, the distant

² Copyright Act of 1976, Pub. L. No. 94-553 § 111, 90 Stat. 2541 (1976).

³ A “non-network” broadcast signal is the signal of a broadcast station that is not affiliated with the major television networks ABC, CBS and NBC. My understanding is that Fox is not considered a network for purposes of Section 111.

⁴ *Nat’l Ass’n of Broadcasters v. Copyright Royalty Tribunal*, 772 F.2d 922, 939 (D.C. Cir. 1985) (CRT “should rely, as it has in the past, on marketplace criteria”); Report of the Copyright Royalty Tribunal in Docket No. CRT 79-1, 45 Fed. Reg. 63,026, 63,037 (Sept. 23, 1980) (compulsory license should not deprive any copyright owner of “relative copyright payment [it] would have received in a free marketplace”); Report of the Copyright Arbitration Royalty Panel in Docket No. 94-3 CARP CD 90-92 at 23-24 (May 31, 1996) (hereinafter, “1990-92 CARP Report”).

⁵ Report of the Copyright Arbitration Royalty Panel in Docket No. 2001-08 CD 98-99 at 9 (Oct. 21, 2003) (hereinafter, “1998-99 CARP Report”).

⁶ *Id.* at 10.

signal retransmission market would not be fundamentally different than under the compulsory license.”⁷

12. From an economist’s perspective, using a market valuation approach is the appropriate way to determine the royalty shares that should be awarded to each of the claimants. Congress intended the compulsory license to be a more efficient way of compensating copyright owners by eliminating the transaction costs that would result from direct negotiations between cable systems and all of the copyright owners of programming retransmitted on distant signals.⁸ I am not aware of any evidence that Congress, through the compulsory license, intended to change the relative distributions that any claimant group would have received in a market. Although the statute does not set forth specific criteria governing how the royalty fund should be divided among the various programming categories, the CRT and CARP conclusions that distributions should approximate relative market value make economic sense because they replicate the hypothetical market value of the copyrights used.⁹ Such a division of the royalty fund preserves as much as possible the free-market incentives that would otherwise exist for copyright holders to create content and permit its use over-the-air.

IV. THE BORTZ CONSTANT SUM SURVEY IS AN APPROPRIATE MEASURE OF THE RELATIVE VALUE OF DISTANT SIGNAL PROGRAMMING

13. In a competitive environment, a market transaction would compensate a copyright holder according to the copyrighted program’s marginal contribution to cable-

⁷ *Id.* at 12.

⁸ “The Committee recognizes, however, that it would be impractical and unduly burdensome to require every cable system to negotiate with every copyright owner whose work was retransmitted by a cable system. Accordingly, the Committee has determined to . . . establish a compulsory copyright license . . .” H.R. Rep. No. 94-1476, 89 (1976), *reprinted in* 1976 U.S.C.C.A.N. 5659, 5704.

⁹ I have discussed this point in more detail in my testimony in prior proceedings. *See* Testimony of Robert W. Crandall (1990-92 Proceeding) (JSC 04-05 Ex. 5 at 7).

system net revenues. In other words, the cable operator would be willing to buy rights to the programming directly or indirectly from the copyright holder according to how much additional revenue the cable operator would generate by retransmitting the copyrighted programming.

14. Determining this "market value" for specific types of programming is difficult. The compulsory license requires the cable operator to pay a minimum royalty every six months even if no programming is retransmitted over that period. Moreover, the cable operator may not insert commercials or otherwise modify the distant signal. As a result, it is almost impossible to determine the precise marginal contribution to a cable system of a specific copyright holder's programming on a distant signal. Therefore, one must look for other evidence to estimate a hypothetical market between copyright holders and cable system operators.

15. The parties in the Phase I proceedings have generally advocated using one of two competing methodologies for determining marketplace value of retransmitted programming: constant sum surveys of cable system managers and household viewing studies.¹⁰ Constant sum surveys ask cable system managers to allocate a percentage of a hypothetical programming budget for the non-network distant signals that they carry to each of the various programming categories – sports, movies, syndicated television series, devotional programs, public television programming, Canadian programming and locally-originated broadcast programming. Household viewing studies use data collected

¹⁰ Various regression analyses have also been offered from time-to-time in these proceedings, including by the JSC in the 1979 proceeding, Program Suppliers in the 1990-92 proceeding and by the Commercial Television claimants in the 1998-99 proceeding. The 1998-99 CARP noted that the regression analysis presented in that proceeding was useful in that it provided some corroboration of the results of the Bortz survey. 1998-99 CARP Report at 50.

by A.C. Nielsen to estimate the number of hours that households watch each program category.

16. As I have explained in earlier proceedings, the constant sum survey is the best tool to answer the question presented in this proceeding. In my testimony for the 1989 proceeding, I explained the economic theory underlying assessments of relative market value and discussed how the constant sum survey – the “Bortz survey” – was the best evidence of those values. *See* Testimony of Robert W. Crandall (JSC 04-05 Ex. 6 at 9-14). In the 1998-99 proceeding, I explained again the value of the Bortz survey data in showing relative market value and discussed why earlier criticisms of the survey were not well-founded. *See* Testimony of Robert W. Crandall (JSC 04-05 Ex. 5).

17. As I also have discussed in my prior testimony, over time, the CRT and the CARP relied increasingly (and properly) on the constant sum surveys of cable executives, the Bortz survey and its predecessors, as the best estimate of relative marketplace value of the copyrighted programming imported by cable systems.¹¹ *See* JSC 04-05 Ex. 5. In the latest CARP decision, the Panel decided that “the Bortz survey is more reliable than any other methodology presented in this proceeding for determining the relative marketplace value of [the JSC, Program Suppliers and Commercial Television] claimant groups.”¹²

¹¹ The CARP considered but rejected the Nielsen viewing study sponsored by the Program Suppliers in the 1998-99 proceeding finding that it “does not afford an independent basis for determining relative value.” 1998-99 CARP Report at 44. The CARP explained that because the Nielsen Study “‘fails to measure the value of the retransmitted programming in terms of its ability to attract and retain subscribers,’ it can not be used to measure directly relative value to [cable system operators].” *Id.* at 38. As I have testified in prior proceedings, this conclusion is consistent with my own views of the Nielsen study. *See* Testimony of Robert W. Crandall (1990-92 Proceeding) (JSC 04-05 Ex. 7); (1989 Proceeding) (JSC 04-05 Ex. 6 at 15-18).

¹² 1998-99 CARP Report at 31. The Panel also found that the Bortz results would serve as a “floor” for determining the relative marketplace value of PTV and that the Canadians were not sufficiently represented in that survey. *Id.* The Panel resolved the Canadians’ share by relying in part on a


18. The advantage of the constant sum survey is that it attempts to measure the relative value that cable system operators place on various program categories. Since these operators would make the program purchasing decisions in the marketplace that would exist but for the compulsory copyright license, this type of survey provides the best information on the operation of the hypothetical marketplace in the absence of actual data on programming purchases, which do not exist. The Bortz survey has been conducted for over 25 years in connection with these proceedings and, over that time, has been refined and improved to respond to various criticisms.¹³ In my opinion, it is a robust and reliable instrument with a significant track record.¹⁴

separate constant sum survey conducted by the Canadians. The Panel did not reach the question of application of the Bortz results to determine the Devotionals' share because they had settled. *Id.* at 72-73.

¹³ For a detailed history of the use of constant sum surveys in previous proceedings, see Section II.A of the Bortz Report (JSC 04-05 Ex. 1 at 10-11).

¹⁴ The 1989 CRT, 1990-92 CARP and 1998-99 CARP reports discuss the various witnesses who have supported the Bortz survey during those proceedings. See Report of the Copyright Royalty Tribunal in Docket No. CRT 91-2-89CD, 57 Fed. Reg. 15,286, 15,292-95 (Apr. 27, 1992); 1990-92 CARP Report at 45-54; and 1998-99 CARP Report at 19-31, respectively. Economists who have supported the Bortz survey over the various proceedings include Vanderbilt University economist Dr. David Scheffman (1990-92; testifying on rebuttal for PTV) (JSC 04-05 Ex. 8 at 21-23); Boston University economist Dr. Michael Salinger (1990-92; testifying for Devotionals) (JSC 04-05 Ex. 9 at 6-10); and valuation expert Paul Much (1990-92; testifying for CTV) (JSC 04-05 Ex. 10 at 2-6).

I declare under the penalty of perjury that the foregoing is true and correct to the best of
my knowledge and belief.



Robert W. Crandall

May 29, 2009
Date

ROBERT W. CRANDALL

CURRENT POSITION:

Senior Fellow, The Brookings Institution, 1978 - Present

ADDRESS:

1775 Massachusetts Ave., NW
Washington, DC 20036

Phone Nos: 202-797-6291

202-244-0056

Fax. No.: 202-797-6181

e-mail: rcrandall@brook.edu

FIELDS OF SPECIALIZATION:

Industrial Organization, Antitrust Policy, Regulation

PREVIOUS POSITIONS:

Adjunct Professor, School of Public Affairs, University of Maryland, 1987 - 1993

Deputy Director, Council on Wage and Price Stability, 1977 - 1978

Acting Director, Council on Wage and Price Stability, 1977

Adjunct Associate Professor of Economics, George Washington University, 1975 - 1977

Assistant Director, Council on Wage and Price Stability, 1975 - 1977

Associate Professor of Economics, M.I.T., 1972 - 1974

Assistant Professor of Economics, M.I.T., 1966 - 1972

Johnson Research Fellow, The Brookings Institution, 1965 - 1966

Instructor, Northwestern University, 1964 - 1965

Consultant to Environmental Protection Agency, Antitrust Division Federal Trade
Commission, Treasury Department, various years

EDUCATION:

Ph.D., Economics, Northwestern University, 1968

M.A., Economics, Northwestern University, 1965

A.B., Economics, University of Cincinnati, 1962

HONORS and AWARDS:

Phi Beta Kappa

MEMBERSHIPS:

American Economic Association
Board of Directors, Baltimore Life Insurance Company

PUBLICATIONS:

Books:

Competition and Chaos: U.S. Telecommunications since the 1996 Act. Washington, DC: The Brookings Institution, 2005.

Broadband: Should We Regulate High-Speed Internet Access? (edited with James Alleman), AEI Brookings Joint Center for Regulatory Studies, 2002.

Telecommunications Liberalization on Two Sides of the Atlantic. (with Martin Cave) AEI Brookings Joint Center for Regulatory Studies, 2001.

Who Pays for Universal Service? When Telephone Subsidies Become Transparent. (with Leonard Waverman) Washington: The Brookings Institution, 2000.

Cable TV: Regulation or Competition? (with Harold Furchtgott-Roth), Washington: The Brookings Institution, 1996.

Talk is Cheap: The Promise of Regulatory Reform in North American Telecommunications. (with Leonard Waverman) Washington: The Brookings Institution, 1996.

The Extra Mile: Rethinking Energy Policy for Automotive Transportation. (with Pietro S. Nivola) Washington, DC: The Brookings Institution/Twentieth Century Fund, 1995.

Manufacturing on the Move. Washington, DC: The Brookings Institution, 1993.

After the Breakup: The U.S. Telecommunications Industry in a More Competitive Era. Washington, DC: The Brookings Institution, 1991.

Changing the Rules: Technological Change, International Competition and Regulation in Communications. (Edited with Kenneth Flamm), Washington, DC: The Brookings Institution, 1989.

Up from the Ashes: The Rise of the Steel Minimill in the United States. (With Donald F. Barnett), Washington, DC: The Brookings Institution, 1986.

Regulating the Automobile. (With Howard K. Gruenspecht, Theodore E. Keeler, and Lester B. Lave), Washington, DC: The Brookings Institution, 1986.

Controlling Industrial Pollution: The Economics and Politics of Clean Air. Washington, DC: The Brookings Institution, 1983.

The Scientific Basis of Health and Safety Regulation. (Ed. with Lester Lave), Washington, DC: The Brookings Institution, 1981.

The U.S. Steel Industry in Recurrent Crisis. Washington, DC: The Brookings Institution, 1981.

Articles, Reports, and Contributions to Edited Volumes:

"Letting Go? The Federal Communications Commission in the Era of Deregulation," *Review of Network Economics*, Vol. 7, Issue 4, 2008.

"Extending Deregulation: Make the U.S. Economy More Efficient," in *Opportunity08: Independent Ideas for America's Next President*. Brookings, 2007.

"Is Mandatory Unbundling the Key to Increasing Broadband Penetration in Mexico? A Survey of International Evidence," 2007, (with J. Gregory Sidak), available at SSRN: <http://ssrn.com/abstract=996065>

"The Adverse Economic Effects of Spectrum Set-Asides" (with Allan T. Ingraham), *Canadian Journal of Law and Technology*, November 2007, pp. 131-40.

"Does Video Delivered Over a Telephone Network Require a Cable Franchise?" (with Hal J. Singer and J. Gregory Sidak) *Federal Communications Law Journal*, Vol. 59 (2007).

"Are Vertically Integrated DSL Providers Squeezing Unaffiliated ISPs (and Should We Care)?" (with Hal J. Singer), in *Access Pricing: Theory, Practice and Empirical Evidence*, Justus Haucau and Ralf Dewenter, eds., Elsevier Press, 2007.

"The Failure of Competitive Entry into Fixed-Line Telecommunications: Who Is at Fault?" (with Leonard Waverman) *Journal of Competition Law and Economics*, Vol 2, 2006, pp. 113-148.

"Broadband Communications," in *Handbook of Telecommunications Economics, Vol II*, Sumit K. Majumdar, Ingo Vogelsang, and Martin E. Cave (eds.), Elsevier, 2005.

"The Remedy for the 'Bottleneck Monopoly' in Telecom: Isolate It, Share It, or Ignore It?" *University of Chicago Law Review*, Vol. 72, No.1, Winter 2005.

"Are Vertically Integrated DSL Providers Squeezing Unaffiliated ISPs (and Should We Care)?," (with Hal J. Singer), in *Access Pricing: Theory, Practice and Empirical Evidence*, Justus Haucap and Ralf Dewenter eds., Elsevier Press, 2005.

"Should Regulators Continue to Breathe Life into Unaffiliated ISPs?"(with Hal J. Singer), *Regulation*, 2005.

"Bandwidth for the People" (with Robert Hahn, Robert Litan, and Scott Wallsten), *Policy Review*, No. 127, October-November 2004.

"Internet Telephones: Hanging Up on Regulation," with Robert W. Hahn, Robert E. Litan, and Scott Wallsten," *The Milken Institute Review*, 2004-III, Vol. 6 No. 3, pp. 30-34.

"Foreign Investment Restrictions as Industrial Policy: The Case of Canadian Telecommunications," (with Hal J. Singer), *Canadian Journal of Law and Technology*, Vol 3, No. 1, March 2004, pp. 19-32.

"Do Unbundling Policies Discourage CLEC Facilities-Based Investment?," (with Allan T. Ingraham, and Hal J. Singer) *Topics in Economic Analysis & Policy*, 2004, Vol. 4: No. 1, Article 1.

"Should Regulators Set Rates to Terminate Calls on Mobile Networks?"(with J. Gregory Sidak) *Yale Journal on Regulation*, 2004.

"Injunctive Relief in Sherman Act Monopolization Cases," (with Kenneth G. Elzinga) *Research in Law and Economics*, Vol. 21, Elsevier, 2004, pp. 277-34.

"Telecommunications Policy and the Evolution of the Internet," in *The New Economy in East Asia and the Pacific*, Peter Drysdale, ed., RoutledgeCourzon, London, 2004, pp. 60-87.

"Does Antitrust Policy Improve Consumer Welfare? Assessing the Evidence," (with Clifford Winston) *Journal of Economic Perspectives*, Fall 2003, pp. 3-26

"The \$500 Billion Opportunity: The Potential Economic Benefit of Widespread Diffusion of Broadband Internet Access" (with Charles L. Jackson), in Allan L. Shampine (ed) *Down to the Wire: Studies in the Diffusion and Regulation of Telecommunications Technologies*, Nova Science Press, Haupaugge, NY, 2003

"An End to Regulation?" in *Competition and Regulation in Utility Markets*, Colin Robinson, ed., Edward Elgar, London, 2003.

"Is Structural Separation of Incumbent Local Exchange Carriers Necessary for Competition?" (with J. Gregory Sidak), *Yale Journal on Regulation*, Vol. 19, No.2, 2002, pp. 335-411.

"The Empirical Case Against Asymmetric Regulation of Broadband," (with J. Gregory Sidak and Hal J. Singer) *Berkeley Technology Law Journal*, 2002

"Universal Service, Equal Access, and the Digital Divide," in *Bridging the Digital Divide*. Hitachi Public Affairs Forum, California Council on Science and Technology, May 2001, pp. 29-38.

"Telecommunications Policy Reform in the United States and Canada," (with Thomas W. Hazlett) in Martin Cave and Robert W. Crandall (eds.), *Telecommunications Liberalization on Two Sides of the Atlantic*, AEI/Brookings Joint Center for Regulatory Studies, 2001.

"The Failure of Structural Remedies in Sherman Act Monopolization Cases," *Oregon Law Review*, Spring 2001, pp. 109-98.

"Sports Rights and the Broadcast Industry" (with Martin Cave), *The Economic Journal*, Vol. 111, February 2001, pp. F4-F26.

"Bridging the Digital Divide – Naturally," *Brookings Review*, Winter 2001, pp. 38-43.

"Local and Long Distance Competition: Replacing Regulation with Competition," in Randolph J. May and Jeffrey A. Eisenach (eds.), *Communications Deregulation and FCC Reform: What Comes Next?* Washington: The Progress and Freedom Foundation, 2000.

"Competition in U.S. Telecommunications Services: Effects of the 1996 Legislation," (with Jerry Hausman) in Sam Peltzman and Clifford Winston (eds.), *Deregulation of Network Industries*, Washington: The Brookings Institution, 2000.

"Competition in Telecom: The U.S. and Canadian Paths," (with Leonard Waverman) in Dale Orr and Thomas R. Wilson (eds.), *The Electronic Village: Policy Issues in Telecommunications*. Toronto: C.D. Howe Institute, 1998.

"New Zealand Spectrum Policy: A Model for the United States?" *The Journal of Law and Economics*, October 1998, pp. 821-839.

"The Impact of Telecommunications Deregulation on Midsize Business," in Gary D. Libecap (ed.), *Advances in the Study of Entrepreneurship, Innovation, and Economic*

Growth: Legal, Regulatory, and Policy Changes that Affect Entrepreneurial Midsize Firms, Stamford, CT: JAI Press, 1998, pp. 23-42.

"Telephone Subsidies, Income Redistribution, and Economic Welfare," in Roger G. Noll and Monroe E. Price, *A Communications Cornucopia: Markle Foundation Essays on Information Policy*. Washington: The Brookings Institution, 1998.

"Electric Restructuring and Consumer Interests: Lessons from Other Industries," *The Electricity Journal*, Volume 11, No. 1, January/February 1998.

"Is it Time to Eliminate Telephone Regulation?" in Donald L. Alexander (ed.), *Telecommunications Policy: Have Regulators Dialed the Wrong Number?*, Westport, CT: Praeger, 1997, pp. 17-30.

"Competition and Regulation in the U.S. Video Market," *Telecommunications Policy*, Vol. 21, No. 7, 1997, pp. 649-660.

"Are We Deregulating Telephone Services? Think Again." *Brookings Policy Brief*, Number 13, March 1997

"Are Telecommunications Facilities 'Infrastructure?' If They Are, So What? *Regional Science and Urban Economics*, 27 (1997), pp. 161-79.

Economic Deregulation and Customer Choice: Lessons for the Electric Utility Industry, (with Jerry Ellig), Center for Market Processes, George Mason University, 1997.

"Telecom Mergers and Joint Ventures in an Era of Liberalization," in Gary Clyde Hufbauer and Erika Wada(eds.) *Unfinished Business: Telecommunications After the Uruguay Round*. Washington, DC: Institute for International Economics, 1997, pp. 107-24.

"From Competitiveness to Competition: The Threat of Minimills to Large National Steel Companies," *Resources Policy*, Vol. 22, Nos. 1/2, March/June 1996, pp.107-118.

"Clearing the Air: EPA's Self-Assessment of Clean-Air Policy," (with Frederick H. Rueter and Wilbur A. Steger), *Regulation*, 1996, Number 4, pp. 35-46.

"Phone Rates in a Deregulated Market," *The Brookings Review*, Summer 1996.

"Competition and Regulatory Policies for Interactive Broadband Networks," (with J. Greory Sidak), *Southern California Law Review*, July 1995.

"The Unregulated Infobahn," (with J. Gregory Sidak), *Jobs & Capital*, Vol. 4, Summer 1995, pp. 28-32.

"Managing the Transition to Deregulation in Telecommunications," in Steven Globerman, W.T. Stanbury, and Thomas A. Wilson (eds.), The Future of Telecommunications Policy in Canada. University of British Columbia and the University of Toronto, 1995.

"Productivity Growth in the Telephone Industry Since 1984," (with Jonathan Galst) in Patrick Harker (ed.), The Service Productivity and Quality Challenge, Dordrecht: Kluwer Academic Publishers, 1995, Chapter 14.

"Cable Television: Reinventing Regulation," The Brookings Review, Winter 1994, pp. 12-15.

"Explaining Regulatory Policy" (with Clifford Winston), Brookings Papers on Economic Activity, Microeconomics, 1994, pp. 1-31.

"Pricing Issues in Telecommunications," Maine Policy Review, Vol. 3, No. 1, May 1994.

"Regulation and the "Rights" Revolution: Can (Should) We Rescue the New Deal?" Critical Review, Vol. 7 Nos. 2-3, 1993, pp. 193-204.

"Comment: Transactions Prices," Price Measurement and Their Uses, (Murray F. Foss, Marilyn E. Manser, and Allan H. Young, eds.), University of Chicago Press, 1993.

"Pollution Controls" in David R. Henderson (ed.), The Fortune Encyclopedia of Economics, New York: Warner Books, 1993.

"Relaxing the Regulatory Stranglehold on Communications," Regulation, Summer 1992, pp. 26-35.

"Regulating Communications: Creating Monopoly While Protecting Us From It," The Brookings Review, Summer 1992, Volume 10, No. 3, pp. 34-39.

"Policy Watch: Corporate Average Fuel Economy Standards," Journal of Economic Perspectives, Spring 1992, pp. 171-80.

"Why Is the Cost of Environmental Regulation So High?" Center for the Study of American Business. St. Louis: Washington University, Policy Study No. 110, February 1992.

"Liberalization Without Deregulation: Telecommunications Policy During the 1980s," Contemporary Policy Issues, October 1991.

"Halfway Home: U.S. Telecommunications (De)Regulation in the 1970s and 1980s," in Jack High (ed.), Regulation: Economic Theory and History. Ann Arbor: The University of Michigan Press, 1991.

"Efficiency and Productivity," in Barry G. Cole (ed.), After the Breakup: Assessing the New Post-AT&T Divestiture Era. New York: Columbia University Press, 1991.

"The Politics of Energy: New Fuel Economy Standards?" (with John D. Graham), The American Enterprise, March/April 1991.

"The Clean Air Act at Twenty," Journal of Regulation and Social Costs, September 1990.

"Fragmentation of the Telephone Network" in Paula Newberg (ed.), New Directions in Telecommunications Policy. Durham, NC: Duke University Press, 1989.

"The Effect of Fuel Economy Standards on Automobile Safety," (with John D. Graham), Journal of Law and Economics, April 1989.

"Surprises from Telephone Deregulation and the AT&T Divestiture," American Economic Review, May 1988, pp. 323-327.

"The Regional Shift of U.S. Economic Activity" in Robert E. Litan, et al., American Living Standards, Washington, DC: The Brookings Institution, 1988.

"Deregulation and Divestiture in the U.S. Telecommunications Sector" in Economic Deregulation: Promise and Performance. Proceedings of the 1987 Donald S. MacNaughton Symposium, Syracuse University, 1988.

"Whatever Happened to Deregulation?" in David Boaz (ed.), Assessing the Reagan Years. Washington, DC: The CATO Institute, 1988.

"Regulatory Reform: Are We Ready for the Next Phase?" in The Brookings Review, The Brookings Institution, Winter 1988/89.

"Telecommunications Policy in the Reagan Era," Regulation, Washington, DC: American Enterprise Institute, 1988, Number 3, pp. 18-19.

"A Sectoral Perspective: Steel" in Robert M. Stern, et.al. (eds.), Perspectives on a U.S.-Canadian Free Trade Agreement, Washington, DC: The Brookings Institution, 1987.

"The Effects of U.S. Trade Protection for Autos and Steel," Brookings Papers on Economic Activity, 1987:2, The Brookings Institution.

"Has the AT&T Breakup Raised Telephone Rates?" in The Brookings Review, Winter 1987.

"Public Policy and the Private Auto," (with Theodore E. Keeler) in Gordon, et.al. (eds.), Energy: Markets and Regulation, Essays in Honor of M.A. Adelman. Cambridge, MA: MIT Press, 1986

"Materials Economics, Policy, and Management: An Overview," with Michael B. Bever, in Encyclopedia of Materials Science and Engineering, Pergamon Press, 1986.

"Metals Industries: International Structure," in Encyclopedia of Materials Science and Engineering, Pergamon Press, 1986.

"The Steel Industry in Transition," Materials and Society, Pergamon Journals Ltd., Vol. 10, No. 2, 1986.

"The Public Interest in Metals Policy," in David A. Gulley and Paul Duby (eds.), The Changing World Metals Industries. New York: Gordon and Breach, 1986.

"Economic Rents as a Barrier to Deregulation," The CATO Journal, Spring/Summer 1986.

"The Transformation of U.S. Manufacturing," Industrial Relations, Spring 1986. "Investment and Productivity Growth in the Steel Industry: Some Implications for Industrial Policy," in Walter H. Goldberg, Ailing Steel: The Transoceanic Quarrel, Gower, 1986.

"The EC-US Steel Trade Crisis," in Loukas Tsoukalis (ed.), Europe, America, and the World Economy, Oxford: Basil Blackwell, 1986.

"Why Should We Regulate Fuel Economy at All?" in The Brookings Review, Spring 1985.

"An Acid Test for Congress," Regulation, September/December 1984.

"Import Quotas and the Automobile Industry: The Costs of Protectionism," The Brookings Review, Summer 1984.

"Automobile Safety Regulation and Offsetting Behavior: Some New Empirical Estimates," (with John D. Graham), American Economic Review, Papers and Proceedings, May 1984.

"The Political Economy of Clean Air: Practical Constraints on White House Review," in V. Kerry Smith, Environmental Policy Under Reagan's Executive Order: The Role of Benefit-Cost Analysis, University of North Carolina Press, 1984.

"The Marketplace: Economic Implications of Divestiture," (with Bruce M. Owen), in Harry M. Shooshan III, Discounting Bell: The Impact of the AT&T Divestiture, Pergamon Press, 1984.

"Environmental Policy in the Reagan Administration," (with Paul R. Portney), in Paul R. Portney (ed.), Natural Resources and the Environment: The Reagan Approach, The Urban Institute and Resources for the Future, 1984.

"The Emerging Competition in the U.S. Telecommunications Market" in New Opportunities for Entrepreneurship, The Kiel Institute, 1984.

"Deregulation: The U.S. Experience," Zeitschrift für die gesamte Staatswissenschaft, October 1983, pp. 419 - 434.

Review of John Zysman and Laura Tyson, American Industry in International Competition, Science, Vol. 222, October 21, 1983.

"Air Pollution, Environmentalists, and Coal Lobby," in Roger G. Noll and Bruce M. Owen (eds.), The Political Economy of Deregulation, American Enterprise Institute, 1983.

"The Use of Environmental Policy to Reduce Economic Growth in the Sun Belt: The Role of Electric-Utility Rates" in Michael A. Crew (ed.), Regulatory Reform and Public Utilities, Lexington Books, 1982.

"The Cost of Automobile Safety and Emissions Regulation to the Consumer: Some Preliminary Results," (with Theodore E. Keeler and Lester B. Lave), American Economic Review, May 1982.

"Environmental Policy," Regulation, March/April 1982.

"Has Reagan Dropped the Ball?" in Regulation, November/December 1981.

"The Use of Cost-Benefit Analysis in Regulatory Decision-Making," Annals New York Academy of Sciences, 1981.

"The Deregulation of Cable Television," (with Stanley M. Besen), Law and Contemporary Problems, Duke University School of Law, Vol. 44, No. 1, Winter 1981.

"The Impossibility of Finding a Mechanism to Ration Health Care Resources Efficiently" in A New Approach to the Economics of Health Care, Mancur Olson (ed.), American Enterprise Institute for Public Policy Research, 1981.

"Pollution Controls and Productivity Growth in Basic Industries" in Productivity Measurement in Regulated Industries, Academic Press, 1981.

"Where is the Public Interest in Broadcasting Regulation?" in Regulation and the Future Economic Environment-Air to Ground, Charles F. Phillips, Jr. (ed.), December 1980.

"The Environmental Protection Agency," (On Saving the Kingdom: Advice for the President-Elect), Regulation, November/December 1980.

"Steel Imports: Dumping or Competition?" in Regulation, July/August 1980.

"Regulation and Productivity Growth" in Proceedings: Conference on Productivity, Federal Reserve Bank of Boston, Martha's Vineyard, June 1980.

"The Prospects for Regulatory Reform," Government Regulation: New Perspectives, Andrew Blair, ed., Pittsburgh: University of Pittsburgh, 1980.

"The Economics of the Current Steel Crisis in OECD Member Countries" in Steel in the 80's, Organisation for Economic Co-operation and Development, Paris, 1980.

"Environmental Control Is Out of Control," Chemical and Engineering News, Vol. 57, April 23, 1979.

"Paying for Government Policy Through the Price Level" in Clarence C. Walton (ed.), Inflation and National Survival, 1979.

"Is Government Regulation Crippling Business?" in Saturday Review, January 20, 1979.

"Federal Government Initiatives to Reduce the Price Level," Brookings Papers on Economic Activity, 1978:2.

"Competition and 'Dumping' in the U.S. Steel Market," Challenge, July/August 1978.

"Regulation of Television Broadcasting: How Costly is the 'Public Interest'?" in Regulation, January/February 1978.

"Placing a Value on the Electromagnetic Spectrum: A Suggested Approach for FCC Decision-Making," Proceedings of the Conference on Telecommunications Policy Research, Airlie House, 1977.

"Theoretical Issues in the Regulation of Communications Common Carriage" in Rate of Return Regulation, FCC Future Planning Conference, July 1976.

"The Postwar Performance of the Motion Picture Industry," The Antitrust Bulletin, Spring 1975.

"An Econometric Model of the Low-Skill Labor Market," (with C.D. MacRae and Lorene Y.L. Yap), The Journal of Human Resources, Winter 1975.

"The Economic Case for a Fourth Commercial Television Network," Public Policy, Harvard University Press, Fall 1974.

"The Profitability of Cable Television: An Analysis of Acquisition Prices," The Journal of Business, University of Chicago, October 1974.

"A Reexamination of the Prophecy of Doom for Cable Television," (with Lionel L. Fray), The Bell Journal of Economics and Management Science, Spring 1974.

"Monopoly," The Dictionary of American History, Charles Scribner's & Sons, 1973.

"FCC Regulation, Monopsony, and Network Television Program Costs," The Bell Journal of Economics and Management Science, Autumn 1972.

Study Guide for Basic Economics (with R.S. Eckaus), Little, Brown and Company, 1972.

Contemporary Issues in Economics: Selected Readings (with R.S. Eckaus), Little, Brown and Company, 1972.

"Economic Subsidies in the Urban Ghetto," (with C.D. MacRae), Social Science Quarterly, December 1971.

"The Economic Effect of Television-Network Program 'Ownership'," The Journal of Law and Economics, Vol. XIV, October 1971.

"The Decline of the Franchised Dealer in the Automobile Industry," The Journal of Business, University of Chicago, January 1970.

"Motor Vehicle Repair, Repair-Parts Production, and the Franchised Vehicle Dealer," Hearings: The Automobile Industry, U.S. Senate Antitrust Subcommittee of the Committee on the Judiciary, 1969.

"Vertical Integration and the Market for Repair Parts in the United States Automobile Industry," The Journal of Industrial Economics, Oxford: Basil Blackwell, July 1968.

RECENT CONSULTANCIES:

Bahamas Public Utilities Commission (2008) – Testimony in law suit involving the privatization of Bahamas Telephone Company

TELUS (2007-08) – Testimony before the Canadian Radio-Television and Telecommunications Commission on various regulatory issues

Telmex (2007-08) –Meetings with government officials on various telecom regulatory
issues

Gulf States Recovery Group (2008) – Testimony in private antitrust suit involving steel
industry

Schmoltz and Bickenback AG (2007-08) – Testimony before the International Trade
Commission on stainless steel imports

Puerto Rico Telephone Company (2007) –Testimony before Puerto Rico
Telecommunications Regulatory Board

Certificate of Service

I hereby certify that on Monday, February 12, 2018 I provided a true and correct copy of the Robert Crandall Written Direct Testimony (JSC Written Direct Statement Vol. II) to the following:

Public Broadcasting Service (PBS), represented by Lindsey L. Tonsager served via Electronic Service at lttonsager@cov.com

National Association of Broadcasters (NAB), represented by Ann Mace served via Electronic Service at amace@crowell.com

Broadcast Music, Inc. (BMI), represented by Brian A Coleman served via Electronic Service at Brian.Coleman@dbr.com

American Society of Composers, Authors and Publishers (ASCAP), represented by Sam Mosenkis served via Electronic Service at smosenkis@ascap.com

Multigroup Claimants, represented by Brian D Boydston served via Electronic Service at brianb@ix.netcom.com

Spanish Language Producers, represented by Brian D Boydston served via Electronic Service at brianb@ix.netcom.com

SESAC, Inc., represented by Christos P Badavas served via Electronic Service at cbadavas@sesac.com

Canadian Claimants Group, represented by Victor J Cosentino served via Electronic Service at victor.cosentino@larsongaston.com

National Public Radio, Inc. (NPR), represented by Gregory A Lewis served via Electronic Service at glewis@npr.org

Devotional Claimants, represented by Michael A Warley served via Electronic Service at michael.warley@pillsburylaw.com

MPAA-represented Program Suppliers, represented by Lucy H Plovnick served via Electronic Service at lhp@msk.com

Signed: /s/ Michael E Kientzle